

 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>ACREDITED</b>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

## APPENDIX D - SAR TEST SETUP & DUT PHOTOGRAPHS

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	 <b>EF Johnson</b> <small>TECHNOLOGIES</small>
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>ACCREDITED</b>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

## BODY-WORN SAR TEST SETUP PHOTOGRAPHS



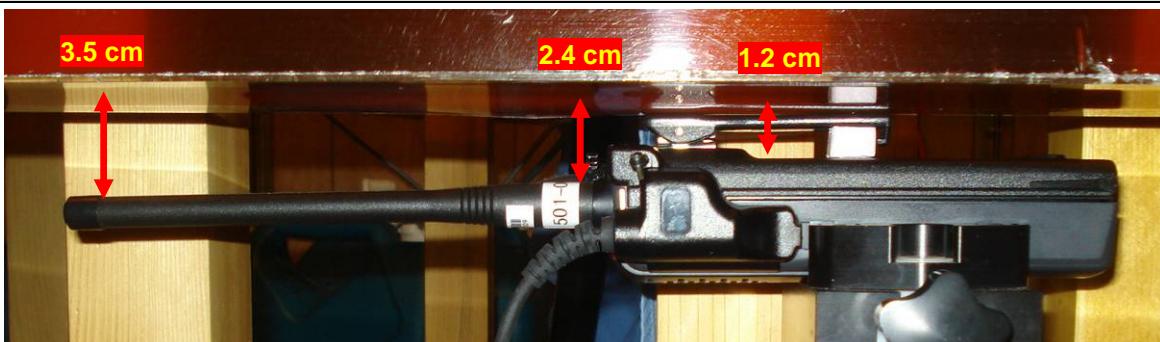
Body-worn Test Setup – Radio with Antenna 1, Body-worn acc. 1, Battery a, Audio acc. 1

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	 <b>EFJohnson</b> <small>TECHNOLOGIES</small>
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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## BODY-WORN SAR TEST SETUP PHOTOGRAPHS



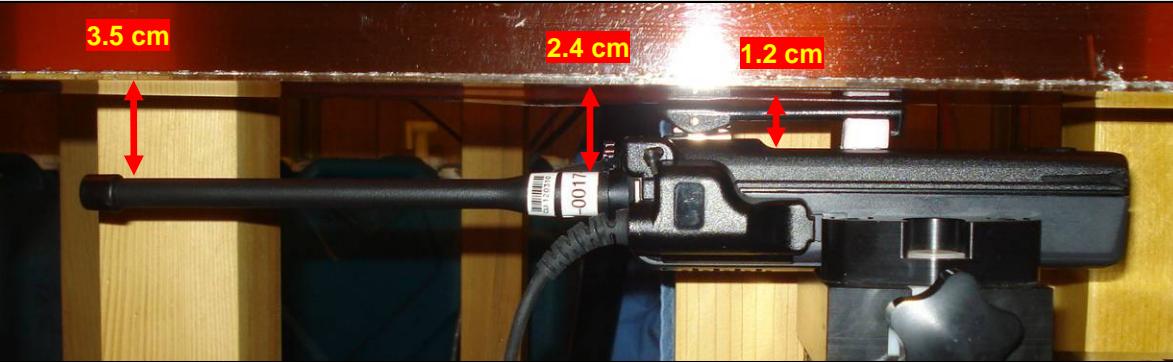
Body-worn Test Setup – Radio with Antenna 1, Body-worn acc. 1, Battery a, Audio acc. 1



Body-worn Test Setup - Radio with Antenna 2, Body-worn acc. 1, Battery a, Audio acc. 1



Body-worn Test Setup - Radio with Antenna 3, Body-worn acc. 1, Battery a, Audio acc. 1



Body-worn Test Setup - Radio with Antenna 4, Body-worn acc. 1, Battery a, Audio acc. 1

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	EFJohnson <sup>TM</sup> TECHNOLOGIES
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	

 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>ACREDITED</b>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

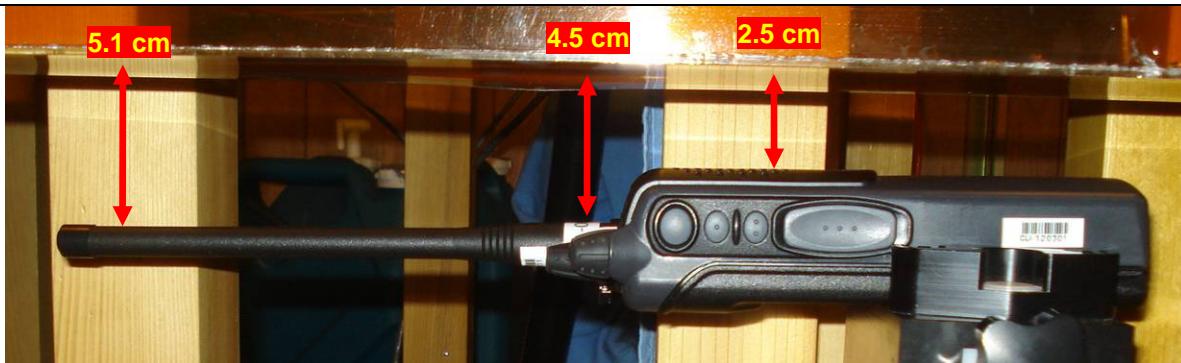
## FACE-HELD SAR TEST SETUP PHOTOGRAPHS



Face-held test setup – Radio with Antenna 1, Battery a

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	 <b>EF Johnson</b> <small>TECHNOLOGIES</small>
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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## FACE-HELD SAR TEST SETUP PHOTOGRAPHS





Date(s) of Evaluation  
Nov. 7-8, 19, 2012

Test Report Serial No.  
110212ATH-S1203

Test Report Revision No.  
Rev. 1.0 (1st Release)

Test Report Issue Date  
Nov. 20, 2012

Description of Test(s)  
Specific Absorption Rate

RF Exposure Category  
Occupational (Controlled)



Test Lab Certificate No. 2470.01

## DUT PHOTOGRAPHS



Radio Front

Radio Left Side

Radio Back

Radio Right Side



Radio Top end

Radio Bottom end

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	

 Celltech <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 IAC-MRA  ACCREDITED
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01



Back of Radio with battery removed



Back of Radio with Battery and Belt-clip



Side of Radio with Battery and Belt-clip

Applicant:	EF Johnson Company	FCC ID:	ATH2425710	IC:	933B-2425710	 EF Johnson <small>TECHNOLOGIES</small>
DUT Type:	Portable VHF PTT Radio	Model:	Viking VP600 Model 1	Freq.:	138 - 174 MHz	

 <b>Celltech</b> Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u>	<u>Test Report Serial No.</u>	<u>Test Report Revision No.</u>	 <b>IAC-MRA</b> ACCREDITED
	Nov. 7-8, 19, 2012	110212ATH-S1203	Rev. 1.0 (1st Release)	
<u>Test Report Issue Date</u>	<u>Description of Test(s)</u>	<u>RF Exposure Category</u>		
Nov. 20, 2012	Specific Absorption Rate	Occupational (Controlled)		Test Lab Certificate No. 2470.01



Antenna 1 - P/N 501-0017-101



Antenna 2 - P/N 501-0017-103



Antenna 3 - P/N 501-0017-105



Antenna 4 - P/N 501-0017-110

<b>Applicant:</b>	EF Johnson Company	<b>FCC ID:</b>	ATH2425710	<b>IC:</b>	933B-2425710	 <b>EF Johnson</b> TECHNOLOGIES
<b>DUT Type:</b>	Portable VHF PTT Radio	<b>Model:</b>	Viking VP600 Model 1	<b>Freq.:</b>	138 - 174 MHz	
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 <b>Celltech</b> Testing and Engineering Services Lab	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>ACCREDITED</b>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01



Battery a - Front

Battery a – Side 1

Battery a - Back

Battery a – Side 2



Battery a – Top end

Battery a – Bottom end

<b>Applicant:</b>	EF Johnson Company	<b>FCC ID:</b>	ATH2425710	<b>IC:</b>	933B-2425710	 <b>EFJohnson</b> TECHNOLOGIES
<b>DUT Type:</b>	Portable VHF PTT Radio	<b>Model:</b>	Viking VP600 Model 1	<b>Freq.:</b>	138 - 174 MHz	

 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>EF Johnson</b> <small>TECHNOLOGIES</small>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01



**Body-worn Accessory 1 - Metal Belt-Clip P/N 585-5100-128**

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	

 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>EFJohnson</b> <small>TECHNOLOGIES</small>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01



**Audio Accessory 1 - Speaker-Microphone P/N 589-0015-073**

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	 <b>EFJohnson</b> <small>TECHNOLOGIES</small>
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>EF Johnson</b> <small>TECHNOLOGIES</small>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

## APPENDIX E - DIPOLE CALIBRATION

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **Celltech**

Certificate No: **D300V3-1009\_Apr12**

## CALIBRATION CERTIFICATE

Object **D300V3 - SN: 1009**

Calibration procedure(s) **QA CAL-15.v6**  
 Calibration procedure for dipole validation kits below 700 MHz

Calibration date: **April 17, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ET3DV6	SN: 1507	30-Dec-11 (No. ET3-1507_Dec11)	Dec-12
DAE4	SN: 900	11-Apr-12 (No. DAE4-900_Apr12)	Apr-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name	Function	Signature
	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 27, 2012

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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

**Glossary:**

TS	tissue simulating liquid
ConvF	sensitivity in TS / NORM x,y,z
N/A	not applicable or not measured

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TS:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TS parameters:* The measured TS parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

<b>DASY Version</b>	DASY5	V52.8.1
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	ELI4 Flat Phantom	Shell thickness: $2 \pm 0.2$ mm
<b>Distance Dipole Center - TSL</b>	15 mm	with Spacer
<b>Zoom Scan Resolution</b>	$dx, dy, dz = 5$ mm	
<b>Frequency</b>	$300$ MHz $\pm 1$ MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	<b>Temperature</b>	<b>Permittivity</b>	<b>Conductivity</b>
<b>Nominal Head TSL parameters</b>	22.0 °C	45.3	0.87 mho/m
<b>Measured Head TSL parameters</b>	$(22.0 \pm 0.2)$ °C	$44.9 \pm 6$ %	0.89 mho/m $\pm 6$ %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	398 mW input power	1.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>2.88 mW /g <math>\pm 18.1</math> % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	398 mW input power	0.770 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	<b>1.90 mW /g <math>\pm 17.6</math> % (k=2)</b>

## Appendix

### Antenna Parameters with Head TSL

Impedance, transformed to feed point	57.8 $\Omega$ - 2.9 $j\Omega$
Return Loss	- 22.2 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.748 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 26, 2009

# DASY5 Validation Report for Head TSL

Date: 17.04.2012

Test Laboratory: SPEAG

**DUT: Dipole 300 MHz; Type: D300V3; Serial: D300V3 - SN: 1009**

Communication System: CW; Frequency: 300 MHz

Medium parameters used:  $f = 300$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 44.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ET3DV6 - SN1507; ConvF(6.59, 6.59, 6.59); Calibrated: 30.12.2011;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn900; Calibrated: 11.04.2012
- Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1003
- DASY52 52.8.1(838); SEMCAD X 14.6.5(6469)

## Dipole Calibration for Head Tissue/d=15mm, Pin=398mW/Zoom Scan (7x7x7)/Cube 0:

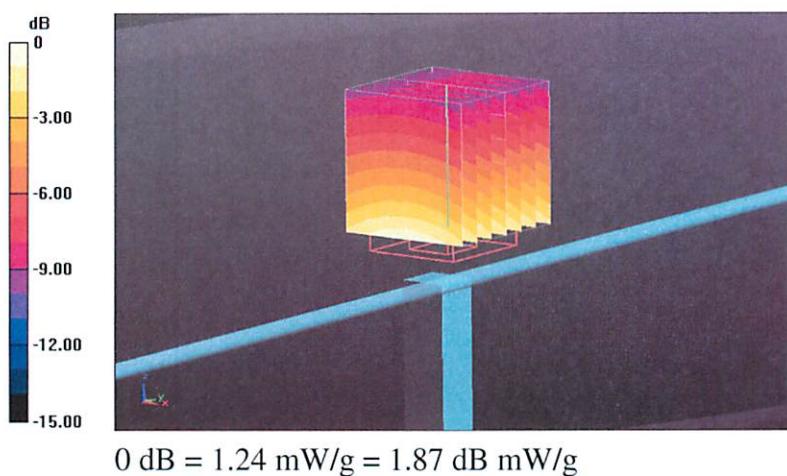
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 37.838 V/m; Power Drift = -0.01 dB

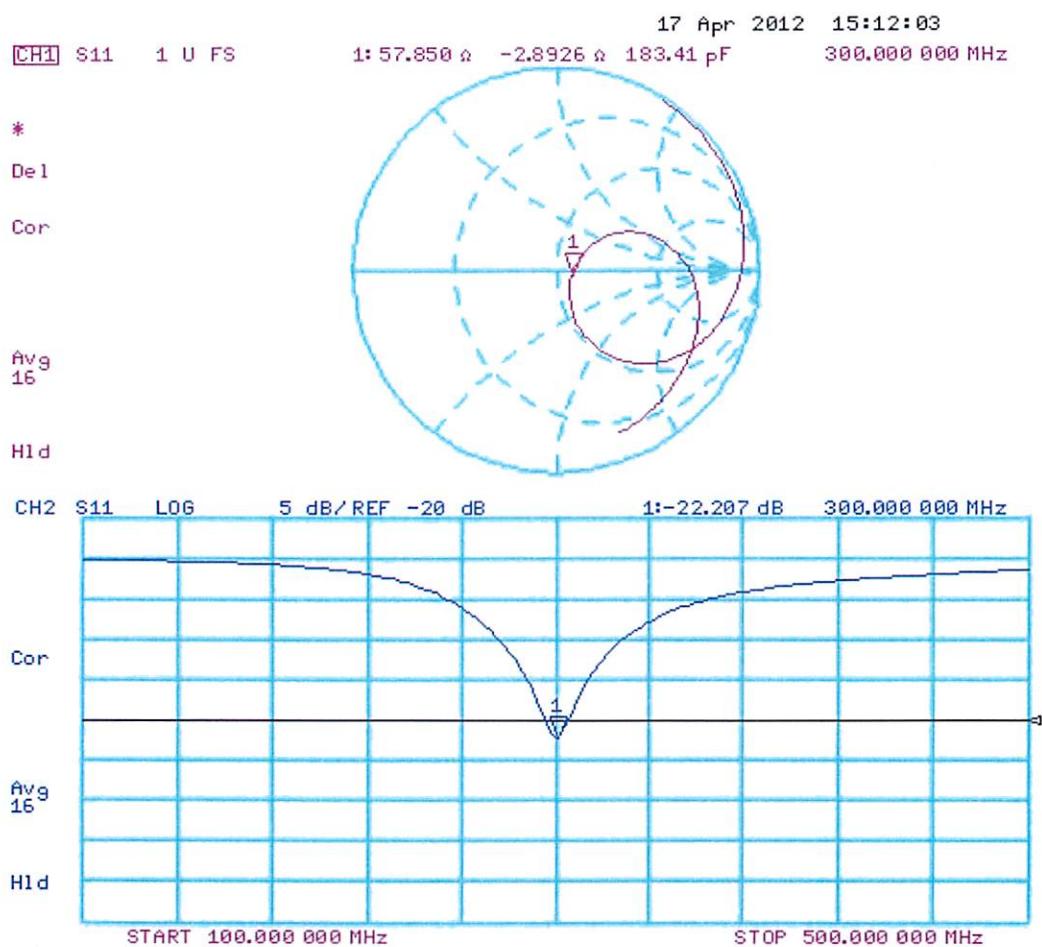
Peak SAR (extrapolated) = 1.974 mW/g

**SAR(1 g) = 1.17 mW/g; SAR(10 g) = 0.770 mW/g**

Maximum value of SAR (measured) = 1.24 mW/g



## Impedance Measurement Plot for Head TSL



 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>EF Johnson</b> <small>TECHNOLOGIES</small>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

## APPENDIX F - PROBE CALIBRATION

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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Calibration Laboratory of  
Schmid & Partner  
Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

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Accreditation No.: SCS 108

Client Celltech

Certificate No: ET3-1590\_Apr12

## CALIBRATION CERTIFICATE

Object ET3DV6 - SN:1590

Calibration procedure(s) QA CAL-01.v8, QA CAL-12.v7, QA CAL-23.v4, QA CAL-25.v4  
Calibration procedure for dosimetric E-field probes

Calibration date: April 24, 2012

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	10-Jan-12 (No. DAE4-660_Jan12)	Jan-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name	Function	Signature
	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: April 26, 2012

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Accreditation No.: **SCS 108**

### Glossary:

TSL	tissue simulating liquid
NORM $x,y,z$	sensitivity in free space
ConvF	sensitivity in TSL / NORM $x,y,z$
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ is normal to probe axis

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- $NORMx,y,z$ : Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORMx,y,z$  are only intermediate values, i.e., the uncertainties of  $NORMx,y,z$  does not affect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORMx,y,z * frequency\_response$  (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- $DCPx,y,z$ : DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- $PAR$ : PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- $Ax,y,z; Bx,y,z; Cx,y,z$ ;  $VRx,y,z$ :  $A, B, C$  are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to  $NORMx,y,z * ConvF$  whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

# Probe ET3DV6

## SN:1590

Manufactured: March 19, 2001  
Calibrated: April 24, 2012

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)

# DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

## Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	1.79	1.92	1.60	$\pm 10.1\%$
DCP (mV) <sup>B</sup>	94.8	98.4	88.8	

## Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	0.00	X	0.00	0.00	1.00	143.4	$\pm 4.6\%$
			Y	0.00	0.00	1.00	150.1	
			Z	0.00	0.00	1.00	179.4	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	43.5	0.87	7.54	7.54	7.54	0.20	2.16	± 13.4 %
750	41.9	0.89	7.11	7.11	7.11	0.29	3.00	± 12.0 %
835	41.5	0.90	6.77	6.77	6.77	0.27	3.00	± 12.0 %
900	41.5	0.97	6.67	6.67	6.67	0.29	3.00	± 12.0 %

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Calibration Parameter Determined in Body Tissue Simulating Media

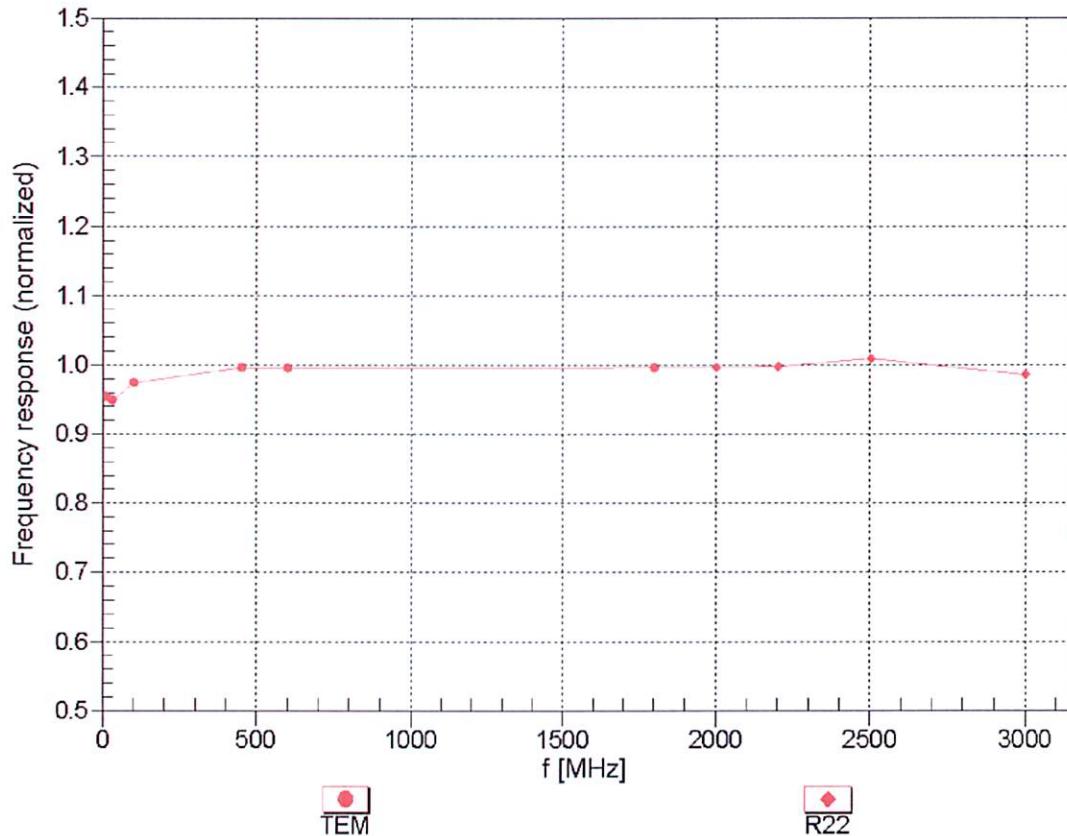
f (MHz) <sup>c</sup>	Relative Permittivity <sup>f</sup>	Conductivity (S/m) <sup>f</sup>	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
450	56.7	0.94	7.93	7.93	7.93	0.12	2.07	± 13.4 %
750	55.5	0.96	6.71	6.71	6.71	0.22	3.00	± 12.0 %
835	55.2	0.97	6.54	6.54	6.54	0.27	3.00	± 12.0 %
900	55.0	1.05	6.51	6.51	6.51	0.29	2.92	± 12.0 %

<sup>c</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

## Frequency Response of E-Field

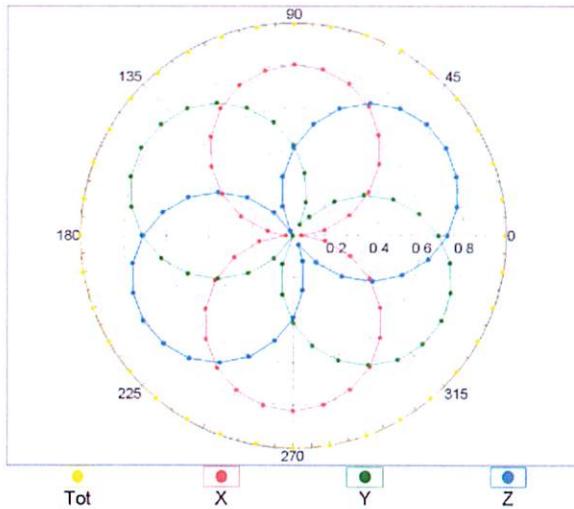
(TEM-Cell:ifi110 EXX, Waveguide: R22)



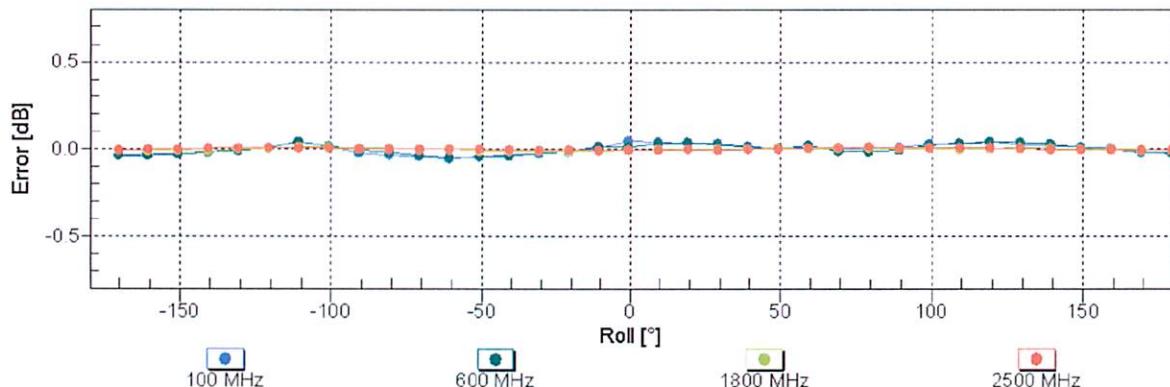
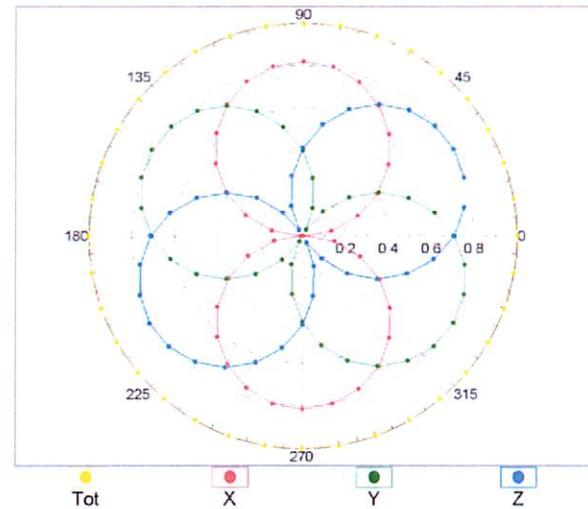
Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

## Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

$f=600$  MHz, TEM

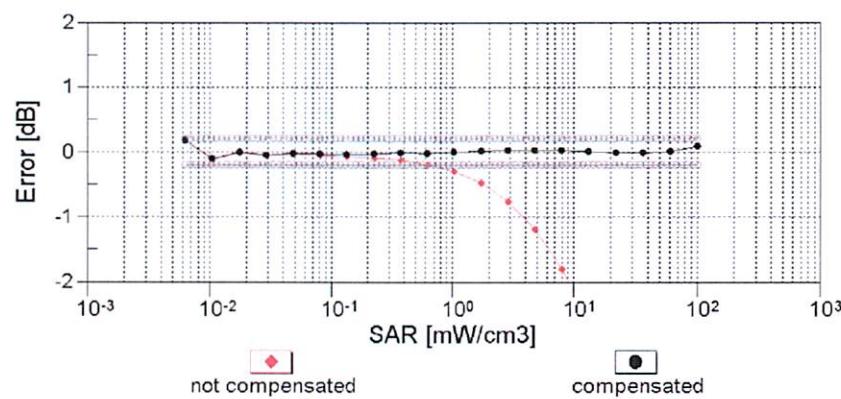
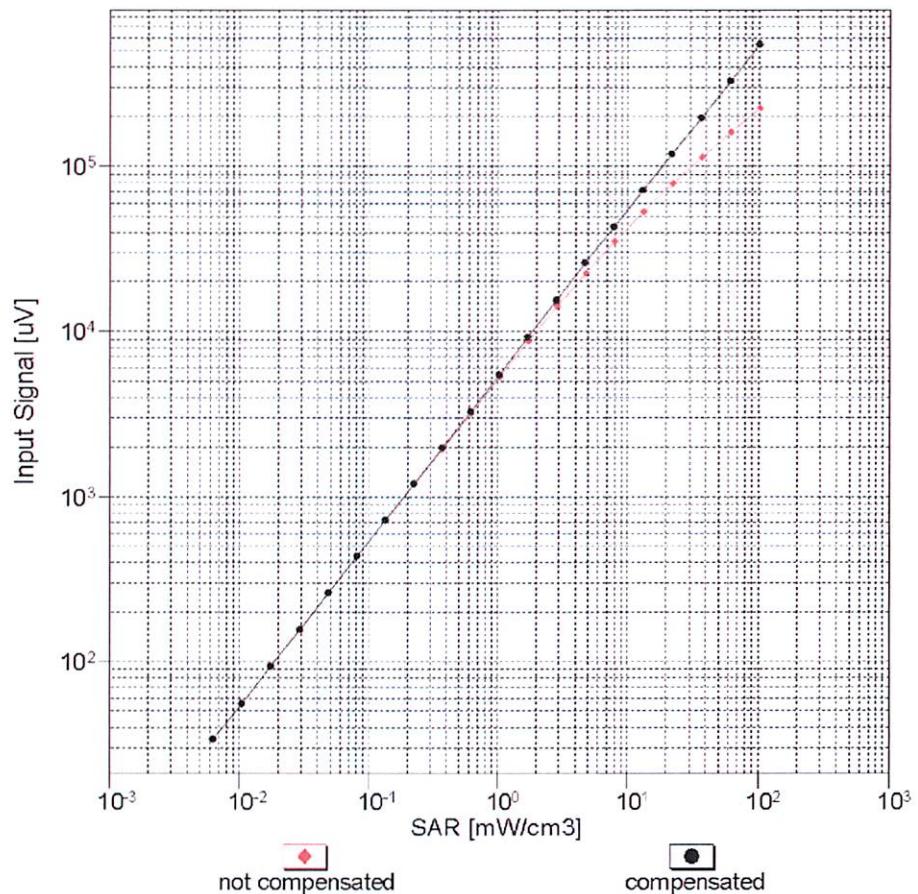


$f=1800$  MHz, R22



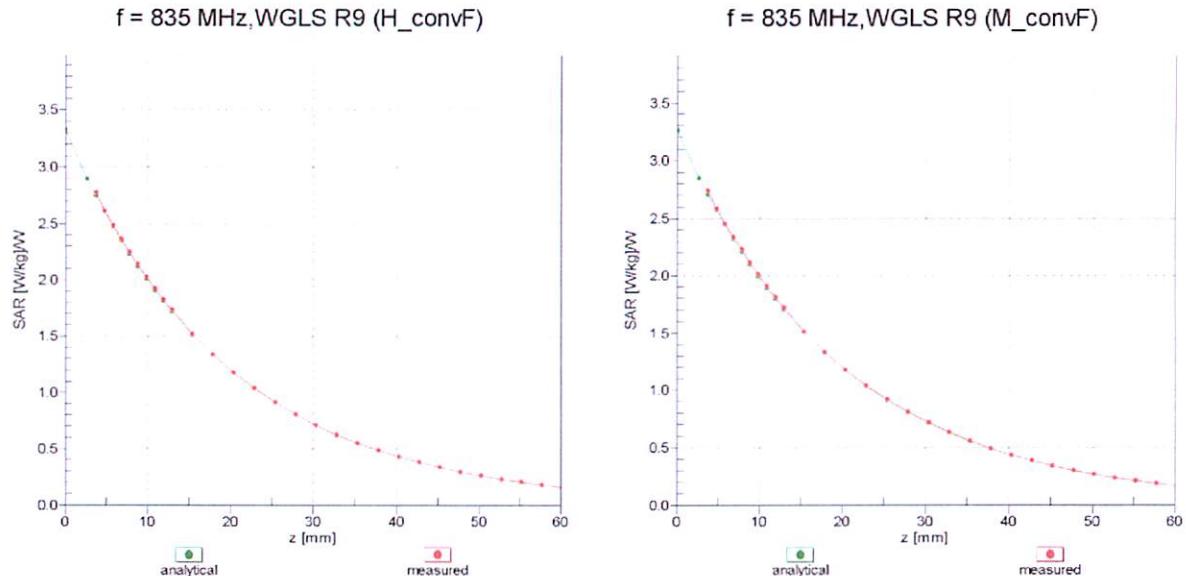
Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

## Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f = 900 \text{ MHz}$ )

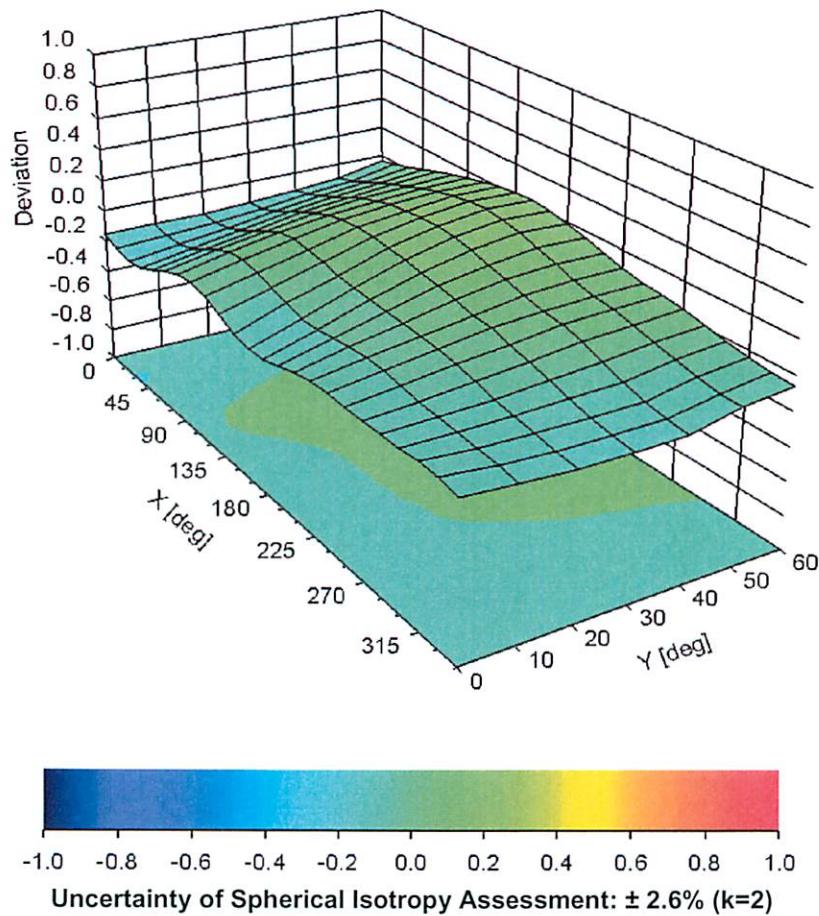


Uncertainty of Linearity Assessment:  $\pm 0.6\% (k=2)$

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error $(\phi, \theta)$ , $f = 900 \text{ MHz}$



## DASY/EASY - Parameters of Probe: ET3DV6 - SN:1590

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-170.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	enabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	6.8 mm
Probe Tip to Sensor X Calibration Point	2.7 mm
Probe Tip to Sensor Y Calibration Point	2.7 mm
Probe Tip to Sensor Z Calibration Point	2.7 mm
Recommended Measurement Distance from Surface	4 mm

## **Additional Conversion Factors**

**for Dosimetric E-Field Probe**

Type:

**ET3DV6**

Serial Number:

**1590**

Place of Assessment:

**Zurich**

Date of Assessment:

**May 21, 2012**

Probe Calibration Date:

**April 24, 2012**

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



## Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ( $\pm$  standard deviation)

**300  $\pm$  50 MHz**

*ConvF*

**8.3  $\pm$  9 %**

$\epsilon_r = 45.3 \pm 5\%$

$\sigma = 0.87 \pm 5\% \text{ mho/m}$

(head tissue)

### Important Note:

**For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.**

**Please see also DASY Manual.**

## Additional Conversion Factors for Dosimetric E-Field Probe

Type:

ET3DV6

Serial Number:

1590

Place of Assessment:

Zurich

Date of Assessment:

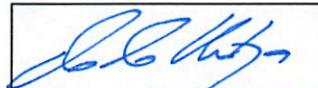
April 27, 2012

Probe Calibration Date:

April 24, 2012

Schmid & Partner Engineering AG hereby certifies that conversion factor(s) of this probe have been evaluated on the date indicated above. The assessment was performed using the FDTD numerical code SEMCAD of Schmid & Partner Engineering AG. Since the evaluation is coupled with measured conversion factors, it has to be recalculated yearly, i.e., following the re-calibration schedule of the probe. The uncertainty of the numerical assessment is based on the extrapolation from measured value at 450, 835 and 900 MHz.

Assessed by:



## Dosimetric E-Field Probe ET3DV6 SN:1590

Conversion factor ( $\pm$  standard deviation)

150  $\pm$  50 MHz      ConvF      9.3  $\pm$  10%

$\epsilon_r = 52.3 \pm 5\%$   
 $\sigma = 0.76 \pm 5\% \text{ mho/m}$   
(head tissue)

150  $\pm$  50 MHz      ConvF      8.6  $\pm$  10%

$\epsilon_r = 61.9 \pm 5\%$   
 $\sigma = 0.80 \pm 5\% \text{ mho/m}$   
(body tissue)

### Important Note:

For numerically assessed probe conversion factors, parameters Alpha and Delta in the DASY software must have the following entries: Alpha = 0 and Delta = 1.

Please see also DASY Manual.

 <b>Celltech</b> <small>Testing and Engineering Services Lab</small>	<u>Date(s) of Evaluation</u> Nov. 7-8, 19, 2012	<u>Test Report Serial No.</u> 110212ATH-S1203	<u>Test Report Revision No.</u> Rev. 1.0 (1st Release)	 <b>IAC-MRA</b>  <b>EF Johnson Technologies</b> <small>ACREDITED</small>
	<u>Test Report Issue Date</u> Nov. 20, 2012	<u>Description of Test(s)</u> Specific Absorption Rate	<u>RF Exposure Category</u> Occupational (Controlled)	

Test Lab Certificate No. 2470.01

## APPENDIX G - BARSKI PLANAR PHANTOM CERTIFICATE OF CONFORMITY

<b>Applicant:</b>	<b>EF Johnson Company</b>	<b>FCC ID:</b>	<b>ATH2425710</b>	<b>IC:</b>	<b>933B-2425710</b>	 <b>EF Johnson Technologies</b>
<b>DUT Type:</b>	<b>Portable VHF PTT Radio</b>	<b>Model:</b>	<b>Viking VP600 Model 1</b>	<b>Freq.:</b>	<b>138 - 174 MHz</b>	
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2378 Westlake Road  
Kelowna, B.C. Canada  
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Ph. # 250-769-6848  
Fax # 250-769-6334  
E-mail: [barskiind@shaw.ca](mailto:barskiind@shaw.ca)  
Web: [www.bcfiberglass.com](http://www.bcfiberglass.com)

## FIBERGLASS FABRICATORS

### Certificate of Conformity

Item : Flat Planar Phantom Unit # 03-01

Date: June 16, 2003

Manufacturer: Barski Industries (1985 Ltd)

Test	Requirement	Details
Shape	Compliance to geometry according to drawing	Supplied CAD drawing
Material Thickness	Compliant with the requirements	2mm +/- 0.2mm in measurement area
Material Parameters	Dielectric parameters for required frequencies Based on Dow Chemical technical data	100 MHz-5 GHz Relative permittivity < 5 Loss Tangent < 0.05

### Conformity

Based on the above information, we certify this product to be compliant to the requirements specified.

Signature: A handwritten signature in black ink, appearing to read 'Daniel Chailler'.

Daniel Chailler



**Fiberglass Planar Phantom - Top View**



**Fiberglass Planar Phantom - Front View**



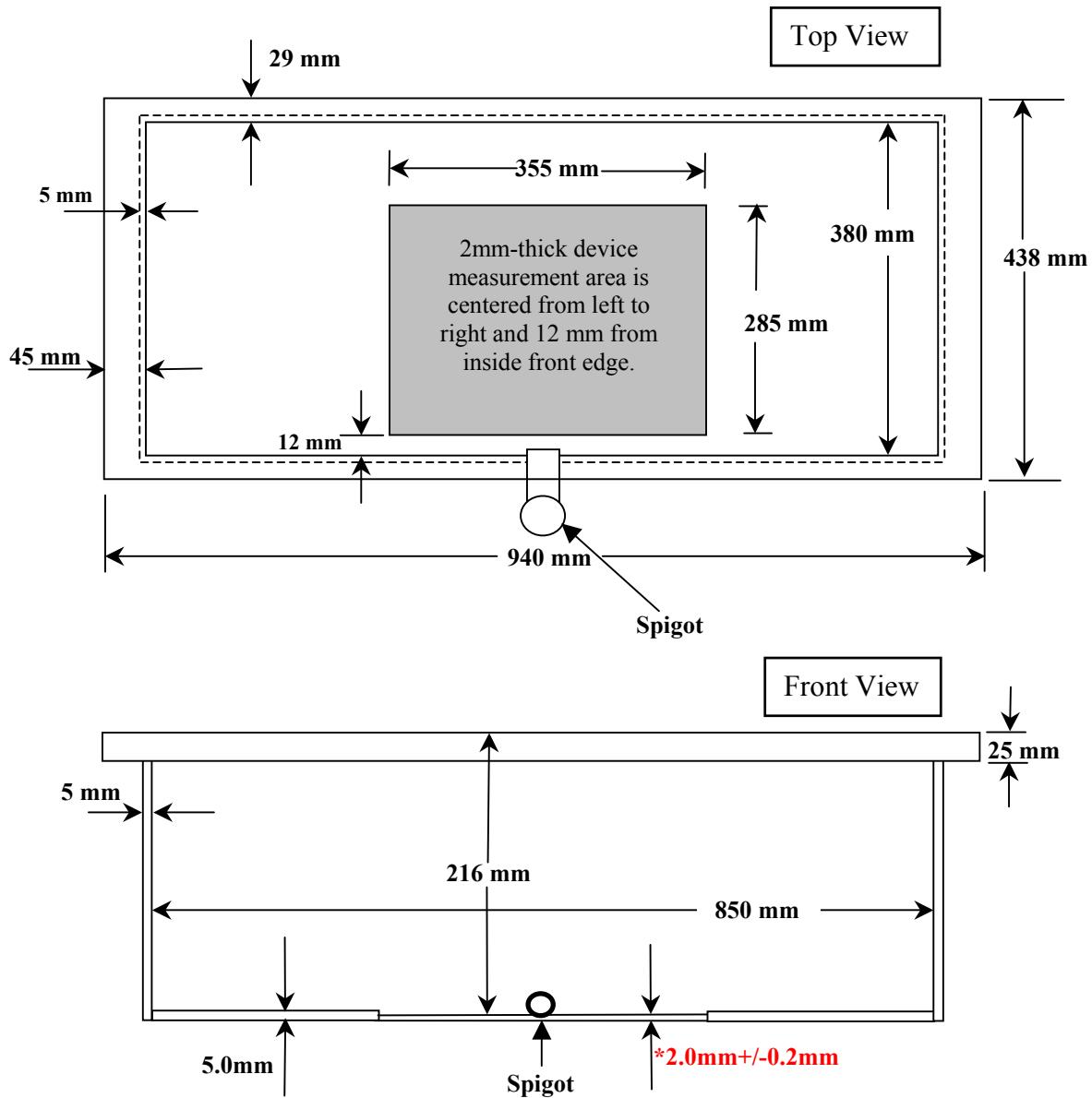
**Fiberglass Planar Phantom - Back View**



**Fiberglass Planar Phantom - Bottom View**

## Dimensions of Fiberglass Planar Phantom

(Manufactured by Barski Industries Ltd. - Unit# 03-01)



**Note:** Measurements that aren't repeated for the opposite sides are the same as the side measured.  
This drawing is not to scale.